

**GRYPOTES PUNCTICOLLIS (HOMOPTERA: CICADELLIDAE),
A PALEARCTIC PINE-FEEDING LEAFHOPPER
NEW TO NORTH AMERICA**

A. G. WHEELER, JR.

Bureau of Plant Industry, Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania 17110.

Abstract.—*Grypotes puncticollis* (Herrich-Schaeffer), an Old World deltocephaline leafhopper belonging to the small tribe Grypotini, was recently detected at Erie, Pennsylvania. Nymphs and adults were abundant on Scotch pine, *Pinus sylvestris* L., and Swiss mountain pine, *P. mugo* Turra. Populations also were found on Scotch pine in nearby Crawford Co. and in three western New York counties: Allegany, Cattaraugus, and Chautauqua. It is suggested that *G. puncticollis* is a relatively recently invader in North America and that it was introduced with egg-infested nursery stock. Adult and nymphal characters facilitating recognition of this immigrant in the Nearctic fauna are provided. Two other leafhopper species were collected on Scotch pine during the survey for *G. puncticollis*: *Empoasca perlonga* Davidson & De Long and *Gyponana geminata* (Osborn).

Key Words: Auchenorrhyncha, immigrant insect, *Pinus sylvestris*, *Pinus mugo*

Grypotes puncticollis (Herrich-Schaeffer) is a Palearctic deltocephaline leafhopper belonging to the small Old World tribe Grypotini (4 spp.). This pine specialist, common throughout much of continental Europe and England, ranges from Scandinavia south to Spain and northern Africa (Algeria, Tunisia) and east to the European USSR and Turkey (Metcalf 1967). Scotch pine, *Pinus sylvestris* L., Austrian pine, *P. nigra* Arnold, and *P. brutia* have been reported as hosts (Ossiannilsson 1983, Lodos and Kalkan-delen 1985 and references therein). This apparently univoltine species overwinters in the egg stage; adults are present from July to October or even early November. In Turkey, *G. puncticollis* has been listed as a pest of *P. brutia* and *P. nigra* (Ossiannilsson 1983, Lodos and Kalkan-delen 1985 and references therein). Metcalf's (1967) world catalogue may be consulted for references to

additional European literature containing ecological notes.

Herein, *G. puncticollis* is reported as new to the Western Hemisphere. North American locality records are listed and mapped, and characters facilitating its recognition in the Nearctic fauna are provided.

DISTRIBUTION AND HOST PLANTS

The initial collection of *G. puncticollis* was made on 21 July 1988 on the Mercyhurst College campus, Erie, Pennsylvania, during routine insect collecting on *Pinus sylvestris*. Although I had collected previously on Scotch pine in Pennsylvania (Wheeler and Henry 1973, Wheeler 1987), I was unfamiliar with the brownish-yellow leafhopper found on this conifer at Erie. Fourth and fifth instars were present and adults were abundant on a row of pines. I suspected that this species was an immigrant, but Hamil-



Fig. 1. Known North American distribution of the Palearctic leafhopper *Grypotes puncticollis*. Black dots indicate established populations; counties in which limited surveys for *G. puncticollis* on Scotch pine were negative are represented by open circles (negative sites in Ohio are not shown).

ton (1983) did not include any Scotch pine feeders among Cicadellidae common to the Old and New World and (1985) noted that leafhoppers were not known from this plant in Canada. K. Valley was able to eliminate the unknown Scotch pine cicadellid as conspecific with any listed in Oman (1949) or Beirne's (1956) leafhoppers of Canada and Alaska. With access to European literature and specimens, E. R. Hoebeke determined the species as the Palearctic *G. puncticollis*.

After this immigrant was identified, surveys were made in Pennsylvania, particularly in the northwestern counties, and in western New York and northeastern Ohio to try to delimit its Nearctic range. The first Erie collection was from Scotch pine, and late instars and adults were found later at the same site on dwarf and on upright, shrubby cultivars of Swiss mountain pine,

P. mugo Turra. For all other collections listed below, *P. sylvestris* was the host; all collections were made by the author in 1988 except for the 13 September collection from Erie, which was made by H. G. Wolff. Specimens have been deposited in the insect collections of Cornell University (CUIC), Ithaca, NY; Pennsylvania Department of Agriculture (PDA), Harrisburg; and U.S. National Museum of Natural History (USNM), Washington, DC.

NEW YORK: *Allegheny Co.*, SUNY—Alfred State University, Alfred, 31 July; *Cattaraugus Co.*, Salamanca, 31 July; *Chautauqua Co.*, Fredonia and Jamestown, 31 July. PENNSYLVANIA: *Crawford Co.*, Allegheny College, Meadville, 1 Aug.; *Erie Co.*, Edinboro, 1 Aug.; Mercyhurst College, Erie, 21 July, 1 Aug., 13 Sept.; North East, 1 Aug.

Although *G. puncticollis* was common on Scotch and Swiss mountain pines in Erie Co., Pennsylvania, and present at one of several localities sampled in Crawford Co., it was not collected on pines in several nearby counties or in other areas of the state. Abundant in western New York, it was not taken in limited surveys in other counties or in northeastern Ohio (Fig. 1).

The abundance of this leafhopper near Lake Erie and failure to detect populations elsewhere suggest a limited distribution in North America and a relatively recent introduction. If *G. puncticollis* had been introduced early in the twentieth century before the United States implemented plant quarantine legislation (Wheeler and Nixon 1979, Kim 1983), it probably would be more widespread and have been detected much earlier. If it were now widely distributed on Scotch pine in Ontario and elsewhere in eastern Canada, it probably would not have been overlooked during recent studies of Canadian leafhoppers and been included in Hamilton's (1983) review of holarctic Cicadellidae or in Hamilton and Langor's (1987) report on the fauna of Newfoundland and Cape Breton Island. It seems reasonable to assume that *G. puncticollis* was introduced to the Lake Erie region with European shipments of conifer nursery stock containing its eggs. Opening of the St. Lawrence Seaway to ship traffic in the late 1950's may have been involved in this introduction. The large volume of maritime shipping along this waterway has been implicated in the spread of an immigrant coccinellid, *Coccinella undecimpunctata* L. (Watson 1979).

RECOGNITION FEATURES

A diverse leafhopper fauna is not characteristic of pines in Pennsylvania. The coelidine *Neocoelidia tuberculata* (Baker) sometimes is common on native pitch pine, *Pinus rigida* Mill., and Virginia pine, *P. virginiana* Mill., and occasionally occurs on cultivated red pine, *P. resinosa* Ait. (personal observation). Few leafhopper species

have adapted to introduced pines like *P. sylvestris*; Hamilton (1985) did not list any Canadian species from Scotch pine. A typhlocybine, *Empoasca perlonga* Davidson & De Long, was commonly encountered on Scotch pine in the survey for *G. puncticollis* in New York and Pennsylvania. Hamilton (1985) reported jack pine, *P. banksiana* Lamb., as its host plant. In Pennsylvania, *Gyponana geminata* (Osborn) also was taken on Scotch pine. This gyponine feeds on jack pine in Canada (Hamilton 1985) and is common on pitch pine in Pennsylvania (personal observation).

From these pine-feeding species and other North American leafhoppers, *G. puncticollis* can be separated by the characters given by LeQuesne (1969) and Ossiannilsson (1983): Head distinctly wider than pronotum, ocelli remote from eyes (about equidistant between eye and median line), and anteclypeus narrow and apically bent caudad. North American material generally agrees with descriptions of European specimens. The adult (Fig. 2) is 3.96–4.68 mm long, brownish yellow, and shining with a greyish-green tinge. Among salient features that can be considered diagnostic are face with 3 dark, often fuscous, transverse streaks, the upper 2 arched and faint or interrupted medially and extending laterally to eyes; vertex with sinuate dark streaks between eyes and oblique dark spots or bars from eye toward base; pronotum with dark spots anteriorly; and scutellum with dark transverse suture and usually 2 dark spots anteriorly. Male and female genitalia are illustrated by LeQuesne (1969) and Ossiannilsson (1983); Villiers (1977) provided a color illustration of the adult.

Ossiannilsson (1983) briefly described the last instar nymph as uniformly brownish, with head much wider than the pronotum, and with longer setae only on abdominal tergites VII and VIII. Last instars from Erie, Pennsylvania, have the head broader than pronotum and lack dorsal setae except at apex of abdomen; coloration, however, dif-



Fig. 2. *Grypotes puncticollis*, adult habitus; scale bar = 1.0 mm.

fers from Ossiannilsson's characterization. Nymphs from Pennsylvania range from pale yellow without dorsal markings (perhaps recently molted individuals) to brownish yellow with well-developed dark markings; the midline is pale in all specimens. Some specimens are suffused with pink, the roseate tinge usually restricted to the wingpads and apex of abdomen. Other prominent features are antennae fuscous except basal segments pale; face generally unmarked except for series of faint transverse lines; vertex usually bearing dark markings, sometimes appearing as nearly circular areas on either side of midline; pronotum with dark spots similar to markings of adult or nearly uniformly brown; wingpads generally pale, area between bases of pads darkened; abdomen usually infuscate, ranging from yellow with dark markings to dark brown with scattered pale spots; legs mostly pale, prominent dark spots at base of hind tibial spines.

Specimens examined: 51 adults and 57 fifth instars from Mercyhurst College, Erie,

Pennsylvania, 21 July and 1 Aug. 1988, on *Pinus mugo* and *P. sylvestris*; deposited in the collections of CUIC, PDA, and USNM.

ACKNOWLEDGMENTS

I am grateful to K. Valley (BPI, PDA) for identifying *Gyponana geminata*, eliminating any native species as the suspected immigrant leafhopper on *Pinus sylvestris*, and reading the manuscript; E. R. Hoebeke (Dept. of Entomology, Cornell University, Ithaca, NY) for identifying *Grypotes puncticollis* and reading the manuscript; M. R. Wilson [CAB International Institute of Entomology, % British Museum (Natural History), London] for confirming the determination of *G. puncticollis*; K. G. A. Hamilton (Biosystematics Research Centre, Ottawa, Ont.) for identifying *Empoasca perlonga*; H. G. Wolff (BPI, PDA) for making a follow-up collection at Erie; J. F. Stimel (BPI, PDA) for the photograph used in Fig. 2; T. J. Henry (Systematic Entomology Lab., USDA, % U.S. National Museum of

Natural History, Washington) for reading the manuscript; and M. Lacey (Systematic Entomology Lab., Taxonomic Services Unit, USDA, Beltsville, MD) for sending specimens to the British Museum for confirmation.

LITERATURE CITED

- Beirne, B. P. 1956. Leafhoppers (Homoptera: Cicadellidae) of Canada and Alaska. *Can. Entomol.* 88 (suppl. 2): 1-180.
- Hamilton, K. G. A. 1983. Introduced and native leafhoppers common to the Old and New worlds (Rhynchota: Homoptera: Cicadellidae). *Can. Entomol.* 115: 473-511.
- . 1985. Leafhoppers of ornamentals and fruit trees in Canada. *Agric. Can. Publ.* 1779. E. 71 pp.
- Hamilton, K. G. A. and D. W. Langor. 1987. Leafhopper fauna of Newfoundland and Cape Breton Islands (Rhynchota: Homoptera: Cicadellidae). *Can. Entomol.* 119: 663-695.
- Kim, K. C. 1983. How to detect and combat exotic pests, pp. 261-319. *In* C. L. Wilson and C. L. Graham, eds., *Exotic Plant Pests and North American Agriculture*. Academic Press, New York.
- LeQuesne, W. J. 1969. Handbooks for the identification of British insects. Vol. II. Part 2 (b) Hemiptera, Cicadomorpha, Deltocephalinae. Royal Entomological Society of London. Pp. 65-148.
- Lodos, N. and A. Kalkandelen. 1985. Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey. 17. Family—Cicadellidae: Deltocephalinae: Grypotini, Goniagnathini and Opsiini (Part 1). *Turkiye Bitki Kor. Derg.* 9: 79-90.
- Metcalf, Z. P. 1967. General Catalogue of the Homoptera. Fascicle VI Cicadelloidea; Part 10 Euscelidae, Section II. *Agric. Res. Serv., U.S. Dept. Agric., Washington, D.C.*, pp. 1078-2074.
- Oman, P. W. 1949. The Nearctic leafhoppers (Homoptera: Cicadellidae): A generic classification and check list. *Mem. Entomol. Soc. Wash.* 3: 1-253.
- Ossiannilsson, F. 1983. The Auchenorrhyncha (Homoptera) of Fennoscandia and Denmark. Part 3: The family Cicadellidae: Deltocephalinae, catalogue, literature and index. *Fauna Entomol. Scand.* Vol. 7, pt. 3. Scandinavian Science Press, Copenhagen. Pp. 594-979.
- Villiers, A. 1977. Atlas des Hémiptères. Généralités-Hétéroptères; Homoptères-Thysanoptères. Société Nouvelle des Éditions Boubée & C^e, Paris. 237 pp.
- Watson, W. Y. 1979. North American distribution of *Coccinella u. undecimpunctata* L. (Coleoptera: Coccinellidae). *Colcopt. Bull.* 33: 85-86.
- Wheeler, A. G., Jr. 1987. *Scymnus (Pullus) suturalis* Thunberg: Southernmost records of an immigrant coccinellid (Coleoptera: Coccinellidae) in the United States. *Coleopt. Bull.* 41: 150.
- Wheeler, A. G., Jr. and T. J. Henry. 1973. *Campozygum aequale* (Villers), a pine-feeding mirid new to North America (Hemiptera: Miridae). *Proc. Entomol. Soc. Wash.* 75: 240-246.
- Wheeler, A. G., Jr. and H. F. Nixon. 1979. Insect Survey and Detection in State Departments of Agriculture. *Spec. Publ. Pa. Dep. Agric., Harrisburg.* 28 pp.